

1. A process for preparing an organically modified aerogel, which comprises:

- a) introducing a hydrogel as initial charge,
- b) modifying the surface of the hydrogel obtained in step a), and
- c) drying the surface-modified gel obtained in step b).

The process as claimed in claim 1 wherein a silicatic hydrogel is introduced as initial charge in step a).

The process as claimed in claim 2, wherein the silicatic hydrogel introduced as initial charge in step a) is prepared by bringing an aqueous waterglass solution to a $\text{pH} \leq 3$ with the aid of an acidic ion exchanger resin, a mineral acid or a hydrochloric acid solution, polycondensing the resulting silicic acid by addition of a base to form an SiO_2 gel, and, if desired, washing the gel with water to free it from any electrolyte.

The process as claimed in claim 2, wherein the silicatic hydrogel introduced as initial charge in step a) is prepared by obtaining it from an aqueous waterglass solution with the aid of at least one organic and/or inorganic acid via the intermediate stage of a silica sol.

The process as claimed in claim 2, wherein the silicatic hydrogel introduced as initial charge in step a) is obtained by hydrolysis and polycondensation of silicon tetrachloride.

6. The process as claimed in at least one of claims 2 to 5, wherein additives are added before and/or during the preparation of the gel.

7. The process as claimed in claim 6, wherein additives added are

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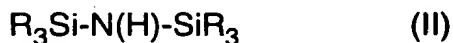
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3.

surface-modified gel obtained in step b).
 alkylating agent (pref hexamethyldisiloxane)
 claimed in claim 1 wherein a silicatic hydrogel is ^{eg in CH₃Cl} silane

opacifiers and/or fibers.

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8. The process as claimed in at least one of the preceding claims, wherein the hydrogel obtained in step a) is aged before being surface-modified in step b).
 9. The process according to at least one of the preceding claims, wherein the hydrogel obtained in step b) is subjected to surface silylation.
 10. The process as claimed in claim 9, wherein the silylating agent is used in liquid form and/or as a gas or vapor.
 11. The process as claimed in claim 9 or 10, wherein the silylating agent employed comprises at least one silane of the formula $R^1_{4-n}SiCl_n$ or $R^1_{4-n}Si(OR^2)_n$ where $n = 1$ to 4 and where R^1 and R^2 independently of one another are identical or different and are each a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical.
 12. The process as claimed in claim 11, wherein trimethylchlorosilane is employed as silylating agent.
 13. The process as claimed in claim 9 or 10, wherein the silylating agent employed comprises at least one disiloxane of the formula I and/or one disilazane of the formula II



where the radicals independently of one another are identical or different and are each a hydrogen atom or a nonreactive, organic, linear, branched, cyclic, saturated or unsaturated, aromatic or heteroaromatic radical.

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14. The process as claimed in claim 13, wherein the silylating agent employed in step b) is a symmetrical disiloxane.

5 15. The process as claimed in claim 13 or 14, wherein the silylating agent employed in step b) is a disiloxane in which all radicals R are identical.

Sub A₇ 16. The process as claimed in at least one of claims 13 to 15, wherein the silylating agent employed is hexamethyldisiloxane.

17. The process as claimed in at least one of the preceding claims, wherein at least one acid and/or base is introduced as initial charge in the hydrogel before surface modification.

15 18. The process as claimed in claim 17, wherein HCl is used as acid.

Sub A₈ 19. The process as claimed in at least one of the preceding claims, wherein the hydrogel is introduced as initial charge in the silylating agent or agents, and then at least one acid and/or base is added.

(Hexamethyl disiloxane) 20. The process as claimed in claim 19, wherein HMDSO is used as silylating agent.

25 21. The process as claimed in claim 19 or 20, wherein hydrochloric acid is used as acid.

Sub A₉ 22. The process as claimed in at least one of the preceding claims, wherein the agent for surface modification is generated shortly before and/or during the surface modification, preferably by means of an acid.

30 23. The process as claimed in at least one of the preceding claims, wherein the surface modification is accelerated by means of a catalyst.

24. The process as claimed in at least one of the preceding claims, wherein at least one carrier gas or carrier gas stream is used in step b) in addition to the agent for surface modification.
- 5 25. The process as claimed in at least one of the preceding claims, wherein some of the water in the pores of the hydrogel reacts with the surface modification agent used to form a water-insoluble compound.
- 10 26. The process as claimed in claim 25, wherein HMDSO is formed.
- 15 27. The process as claimed in at least one of the preceding claims, wherein the outer surface of the hydrogel is dried prior to surface modification.
- 20 28. The process as claimed in claim 27, wherein the outer surface is dried by means of at least one gas.
- 25 29. The process as claimed in claim 27 or 28, wherein the outer surface is dried by means of HCl gas.
- 30 30. The process as claimed in claim 27, wherein the outer surface is dried by means of HMDSO.
- 35 31. The process as claimed in at least one of the preceding claims, wherein the surface-modified gel is washed with a protic or aprotic solvent prior to step c).
- 40 32. The process as claimed in at least one of the preceding claims, wherein the surface-modified gel is washed with a silylating agent prior to step c).
- 45 33. The process as claimed in at least one of the preceding claims, wherein the surface-modified gel is subjected to subcritical drying in

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step c).

34. The process as claimed in at least one of claims 2 to 33, wherein the gel obtained in step a) is reacted, prior to silylation, with a solution of a condensable orthosilicate of the formula $R^1_{4-n}Si(OR^2)_n$, preferably an alkyl and/or aryl orthosilicate, where $n = 2$ to 4 and R^1 and R^2 independently of one another are hydrogen atoms or linear or branched C_1 - C_6 -alkyl, cyclohexyl or phenyl radicals, or with an aqueous silicic acid solution.

35. The process as claimed in one of the preceding claims, wherein surface modification is carried out in the presence of additives in the hydrogel.

36. The process as claimed in claim 35, wherein additives used are ionic compounds, (preferably NaCl.)

37. The process as claimed in claim 35 or 36, wherein additives used are opacifiers, preferably IR opacifiers.

38. An aerogel which is free from Si-OR groups.

39. An aerogel the degree of coverage of whose internal surface with organic surface groups which have been applied by surface modification, preferably surface silylation, is at least 90% of the theoretically possible value.

40. The aerogel as claimed in claim 39, which has a degree of coverage of at least 2.6 trimethylsilyl groups per nm^2 .

41. The aerogel as claimed in any of claims 38 to 40 which comprises additives.

42. The aerogel as claimed in claim 41 which comprises ionic

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compounds, preferably NaCl, as additives.

43. The aerogel as claimed in claim 41 or 42 which comprises opacifiers, preferably IR opacifiers, as additives.

44. The aerogel as claimed in any of claims 41 to 43 which comprises fibers as additives.

45. The aerogel as claimed in at least one of claims 41 to 44 which has a BET internal surface area of less than $600 \text{ m}^2/\text{g}$, preferably less than $500 \text{ m}^2/\text{g}$.

46. An aerogel which has a thermal conductivity of $< 12 \text{ mW/mK}$.

47. The aerogel as claimed in at least one of claims 38 to 46 which is based on silicate.

48. The use of an aerogel as claimed in at least one of claims 38 to 47 as a thermal insulation material.

49. A process for producing an organically modified lyogel, which comprises

- a) introducing a hydrogel as initial charge and
- b) subjecting the hydrogel obtained in step a) to surface modification.

50. A lyogel which is free from Si-OR groups.

51. A lyogel the degree of coverage of whose internal surface with organic surface groups which have been applied by surface modification, preferably surface silylation, is at least 90% of the theoretically possible value.

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52. The lyogel as claimed in claim 50 or 51 which is a hydrogel.

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53. The use of a lyogel as claimed in at least one of claims 50 to 52 in chromatography, in cosmetology and in the pharmaceuticals sector.

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